Introduction and Background

I'm so excited to introduce my next guest. Doctor Peter Kohn supports and manages clients with chronic conditions using a comprehensive approach by merging the exciting advances of functional neurology and functional medicine.

Doctor Khan is a board certified in Integrative Medicine, Functional Medicine, and a board Certified Chiropractic neurologist. He is the creator of the Neuro Metabolic Integration, a science based virtual online coaching program that identifies the root cause of autoimmune and other chronic conditions.

Over 5000 clients from across the country have come to seek out his holistic approach that is changing the lives of those suffering from chronic conditions.

Born in Taiwan and immigrated to America at the age of 13. Doctor Khan has a deep appreciation of eastern wisdom and Western advances in natural health care.

He believes in the God given ability of the body to heal and regulate itself. Doctor Khan, thanks for joining me. Thank you so much for having me. Jason, it's a pleasure.

Well, you know, I really do appreciate that about you. The eastern plus Western, right? This is a passion that I have, just in my own investigative, search for.

For what? Health is, right? I mean, what is health? Where does it come from? How is it maintained? What is life? These are deep spiritual, existential questions that have been investigated for thousands and thousands of years from many, many cultures. Right.

So there's so much wisdom in some of these ancient traditions. And so anybody that's looking into that and at least considering it as part of a Western approach, I think can can really, come up with some profound insight into, how maybe even deeper wisdoms that that Western medicine holds that it doesn't even realize yet. Right?

So there's, there's really, really cool things there. And before we we got on your we were talking about functional neurology and, something I've grown a deep appreciation for.

So maybe we can start there. Just, if people aren't familiar with functional neurology, how is that different from functional medicine? And, and what are some of the key aspects of why it's such an important area of study?

Yeah, that's a great that's a great question to start off with because, I believe that understanding the brain is, is a key part of understanding anyone with chronic conditions, right?

Not just brain specific neurodegenerative degeneration disease, but any type of chronic condition. There's always a brain component to it.

Functional Neurology vs Functional Medicine

And, so the difference between functional medicine and functional neurology, I guess it's more similar than it is different because both are looking at the underlying mechanism of why someone will have a specific symptom or specific condition.

Right. We're looking at the root causes. It's a non-linear type of thinking, but it's still very base and grounded in science and anatomy and physiology.

Very much so actually. So we're just using the understanding that the basic how the body works and reverse engineering to understand where the symptoms come from.

That's really what it is. I think in functional neurology, what we do is we try to identify a longitudinal level lesion. And so what that means is that you have the neuro axis.

Right. So brain you have the brain and spinal core and all the spinal nerve root. I innervate every single part of the body. And in functional neurology we seek to understand okay where is the level of the lesion.

Is it all the way up here. And the cortex is in the brainstem. Vagus nerve is in the cerebellum is in the spinal core peripheral nerve. So we try to understand where is the actual problem.

And then we will apply specific therapies. Now the therapy could be specific type of exercises. Specific type of therapy that we can aim at a specific part of the brain.

This could be electrical stimulation. This could be adjustments. This could be manual therapy like massage. This could be vibration or temperature or sound or light stimulation to the eye.

So any type of these natural ways that we can stimulate the brain or different parts of the nervous system, that's all we do. Now I would include that we can also stimulate the brain with nutrition.

For example, if you have neurotransmitter deficiency and you don't, you have low dopamine and dopaminergic neurons don't fire as well because you're lacking the precursor to form neurotransmitters.

Then taking nutritional supplement that give you the precursor so you can make more dopamine, you can have a increase frequency of firing of that neuron.

That neuron will have more fuel to be able to make. Neurotransmitter therefore will help it fire better. Okay. So there's different ways that we can go about stimulating the brain.

So understanding the brain and applying in a functional model I believe really helps me personally and I believe will help all practitioners to apply functional medicine better because you have that brain component that you can actually further explore where you may not have gotten, you know, or plateau or not gotten anywhere with a particular patient.

I couldn't agree more. That's fantastic way to approach that. Right? Because functional medicine is great, and good medicine is a it's a framework through which we can look at disease or, or health or dysfunction.

Right. And and so when you have, a functional neurology background, you understand how the brain, the nervous system, is, is functioning and how it interrelate to all the other systems in the body.

Right? That is the key component. And so with that sort of central, foundational understanding of probably the most foundational system in the body, then we can start to understand these things like gut dysfunctions and chronic pain and, and, and sleep disturbances and, hormone imbalances and all these other things.

Right. And so I know, let's say I wanted to talk tapping into one of your big areas of focus, which is sort of this access between the brain, the gut and the immune system.

Right. And and sort of you you've kind of coined this sort of big idea or big, sort of acronym, right? The brain, immune gut. And it's beautiful. I wonder, I'm curious, what is it about those three systems that you find are so synergistic in terms of the dysfunction and and the function and the harmony?

How are those systems related? Sort of on a big picture level. Yeah. And you know, I actually, I don't want to say stumbled onto it. It's really just a lot of years of practice, you know, at a very high level.

And it just paying attention. Right. Because it's very easy in practice to just do the same thing over and over again. Oh everybody leaky gut. Just take this and then, you know, whether people got better or not.

And sometimes, you know practitioner can blame it on something now as well. They didn't follow the protocol or you know, they have Candida or they just old.

But if you really pay attention, what I found, how I stumbled onto this big idea, is that I see when people come in with Lyme disease or they're coming with mold issues, or they're coming with fibromyalgia, or they're coming with Hashimoto's, right.

All these condition. And every time when I take an inventory and assessment of what they're struggling with, invariably all these people with different conditions all come with three sets of problems, brain symptoms in them, and then got symptoms like almost without fail.

If you have fibromyalgia, I'm seeing people with symptoms like brain fog and fatigue, and they have immune system problem like inflammation. And they have gut issues like gas, bloating, constipation.

When I see somebody with Hashimoto, same set of problems when I see people with Lyme disease, a similar set of problems. Certainly there's some differences, but I sort of see this common denominator of brain, immune, gut sometimes doesn't matter what the diagnosis is, which is another reason why I started investigating a more, because that helps simplify the clinical process, because if you're chasing diagnosis, you'll never get there, because a diagnosis doesn't tell you what's causing the diagnosis.

The Brain-Immune-Gut Triangle

But by focusing on what's the common denominator between all these people with Lyme and mold and Hashimoto's and stuff like that, they have similar symptoms, then that help us to be able to target the common denominator, which in this case turn out to be there's interconnection between the brain, immune and gut.

Now, it's no secret that there's a brain gut connection. Some people say the gut brain connection I think, depends on who you talk to. They may say the brain gut connection, and they favor the brain.

They may say the gut brain connection if they favor the gut more kind of like the person who says gut brain connection may say that, or the gut controls brain function well.

And the person who say brain gut, they'll say the brain controls gut function. I've noticed this. Yeah. You know, so and reality is that it's it's a it's bidirectional.

Right. So we don't want to be we don't want to be. So, a skew to the fact that it's not that, that the, the gut is more important than the brain or the brains are more important than the gut, the both equally important because in the body, it's not the body's not compartmentalize.

Everything's working at the same time, all the time. Every single part of your system is all connected and communicating at the same time. So we want to think about it is how are they interconnected.

So we have the brain axis that's already been talked about many, many times. And I think that my my contribution to this will be that I'm bringing the attention to the immune system as part of this brain immune gut connection, because if we just say brain gut connection, we're kind of just thinking, oh, you know, your gut is dysfunctional, take some probiotic and your brain, your depression will go away.

Well, it's not that simple, right? Certainly there's research in that field that shows that yeah, your microbiomes not working right. It can definitely impact the brain in a way that can cause brain inflammation, that can lead to depression, anxiety and so forth.

And and some studies have shown that improving the gut microbiome can improve those mood disorders, but not

in every single person. Right? We can't say every single person with depression that takes a probiotic.

The depression is gone. So certainly is not a 1 to 1 ratio. So then there's other things that's involved in it. So so again, the point of bringing in the brain in the gut is not just give stuck on.

Oh just fix my gut. And everything in the brain will get better. It's to realize that there's a brain immune gut connection and there's a three way triangle.

And furthermore, between the brain and in gut, there are many factors that can throw off the brain. Immune got access. So it's not just like, okay, if I just improved my brain even got one to be fine.

So let me take a supplement for my immune system, and you take a supplement for my gut and take a supplement for my brain, and everything will be okay.

It's really understanding the brain in the gut. Is that how symptoms manifest and how these three systems coordinate so that you can have proper function, but that there are other root causes and other triggers that can throw off the brain or the gut.

So that that became a framework for a roadmap that I developed, a clinical roadmap that helped me to simplify the process of solving complex condition, to make it simple.

Right. It's not necessarily easy, but makes this simpler. So we're not chasing 50 different rabbit holes, but be able to like, okay, let's focus on this bringing you got access.

And what do we need to do first, second and third and be able to get results in a more predictable way? Yeah. No I think it's critical. What you're pointing to this, this this connection between all three, and in this interrelated, aspect because, you know, this is where if we can accept that that premise and that idea and this is where we can we can look at things like, and you mentioned before a new functional neurology sort of intro things like light, things like sound, right.

These sort of stimulative aspects to the brain. Well, if we can conceptualize that the brain is connected to the immune system in the gut. Now, I can understand that sound, that light, can actually impact my immune system, can actually impact my gut.

And that's a fascinating thing to try to work out, because we may not know the all the exact mechanisms or perhaps some people do, but but this is where I think it becomes really profound.

And when you when you create this, there's this triangle, of interconnectedness between these three systems. Now we're starting to recognize, oh, it's not just what I eat that impacts my gut.

And it's not just the probiotics. It's not just the maybe fasting or what things that I do to directly try to impact the gut system, but it's all these other things too, right?

It's the exercise. It's the sleep. It's the, the the emotional turmoil or stress or perhaps childhood trauma that's affecting things. Right? Like there's so many things that start to work into this triangle.

And now I can understand that there's a it helps bring me into a framework whereby all these other things can start to make a big impact on all these three systems.

Right? Absolutely. And I think you brought up a very good point, Jason, that, you know, it's speaking of light and sound, how that impact the brain. Okay. So people may be asking, okay.

So light and sound, you know, your brain process light and sound. How does that throw off my immune system or my gut. Well, let me give you an example, if I may, because this will help people to see that that connection so light and sound when it enters your brain, right light perceive by your eye and and sound perceive by your auditory

nerve.

Go through to a part of your brain that's called a mes and cephalon. That's a part of your midbrain. The midbrain is on the very top of your brain stem, and that's the very top of your autonomic nervous system control center.

Okay. So autonomic nervous system is a part of nerves. And that controls everything on autopilot, including your heart rate, your sweating response fight or flight response, parasympathetic nervous system function, digestion.

So that means and cephalon which is a midbrain has an area in there called a superior colliculus and inferior colliculus. And this is where the light and sound information ultimately ASR filter.

So the optic nerve an arbitrary nerve filter through that those area. And the reason cephalon. So why am I telling you this well meaning saffron is the starting point where that that nerve signal for sympathetic response comes from.

So your fight, fight or flight response comes from the Meese and Cephalon game. So what that means is that if you shine a light in someone's eye that's really bright, you can actually will trigger a sympathetic response.

Not necessarily. This person will freak out and panic, but you start to see pupil constriction and that's a sympathetic response right now in someone who's already sympathetically driven, like in a fight or flight response, chronically to the point where they're or they have PTSD, that's driving the sympathetic response to the point where they're constantly anxious, not sleeping well, they're getting inflamed because of it, because there's a pathway from being in fight or flight triggering inflammation.

That's called neurogenic inflammation. So when you're already stressed and fragile and inflamed and in fight or flight and you shine a bright light into someone's eye, you might actually just overwhelm that area that's already on fight or flight.

And you shine extra light input, which triggers more fight or flight. Now they just get pushed into panic mode, or they crash and they start feeling terrible.

In fact, you know, a lot of people with migraines, many times they'll oh yeah, bright light, loud sound noises. When I have migraines, I have to go in a dark room, shut all the lights off and right.

And a lot of people experiences, even if they don't have migraines, that chronic condition, many people will say, yeah, bright lights and loud. That loud noises bother me.

It makes my fatigue worse. Or brain fog wars. So that's the connection between the brainstem and light and sound input that can potentially, potentially a sympathetic flight, fight or flight response that can actually make their immune system more activated, which makes them more inflamed.

So there's your brain immune connection. And when you get into more fight or flight response, then you're decreasing the parasympathetic function which decreases vagus nerve function.

So now your digestion is compromised. So that's your brain gut connection. So you have this brain immune connection that can be triggered in someone that get exposed to too much light and sound.

If they're already overly activated in that part of the neural axis. So this is why they're identifying a problem in that specific region can give us clues, and even how to help that person.

Maybe we can block out sunlight and the way red glasses or, you know, block out some sound, you know, put, earplugs when they go to, you know, store when it's very loud and so forth.

So those are things that we can do to help that person get better. Yeah. And, you know, one of the, tests that I know, that is sometimes done in, in, functional neurology is, you know, might snap into somebody's ear.

Right. And fairly, fairly moderate sound, but it scares the, the heck out of them. Right. And they have a really strong response. Right. These type of things.

So so that's a perfect example where there's something going on at the brain level. Right. And if you know that and then you have an understanding of how it's connected the immune system and, and the gut.

Now we can, we can really trace a lot of dysfunction that's going on in the body that seems not really connected. Right. So this is again pointing to functional neurology.

And with some of the amazing tools that you guys have to to to do an analysis on, on the different regions of the brain. And another thing you thought of, that I thought of, as you mentioned, that is that we're all familiar with is sort of this preset phallic phase of digestion. Right?

So even smells.

How Light and Sound Affect the Nervous System

Right, like if somebody is cooking an amazing, meal and we smell that, well, all of a sudden, you know, if things are working properly, we start to salivate, right?

The digestive function starts to increase. Right? So I guess I'm just continuing to point to this idea that there's so much interrelated aspect to to these things that you're talking about.

And why it's so important to, to focus on all three. Right? And not just one, which is a very common thing, you know, when you, when it comes to autoimmune dysfunction, right, or, or any inflammatory hyper inflammatory conditions, there tends to be this look at one dominance to, you know, and really hyper focus on the immune system.

We can kind of lose sight of the fact that, you know, maybe there's some brain dysfunction going on. Maybe, maybe there's really, maybe this gut is driving this thing, or maybe it's all three.

Right? So maybe you can talk to me about some of the kind of autoimmune conditions, since this is a fairly rampant issue that we're seeing now, whether it be, you know, directly autoimmune or perhaps even, food sensitivities and some of these things that we're seeing on that side.

How does the brain, come into play as well as the gut? And how do we think about that from a resolution perspective? That's a great question. And I think I'm going to start with what, is it kind of maybe intuitive for, for most people who's heard of the broken gut brain connection?

And is that if your brain start to lose its frequency firing? When I say frequency firing, meaning that your neurons, your brain cells fire in a specific frequency, right?

They fire on and off like this. And that's why you when you do EEG, you have the alpha wave, you have the delta wave. These waves are how fast is your brain kind of beating like this.

Right. So a delta wave when you're sleeping is beating slower, like a five hertz or an alpha wave. You are about 10 to 15Hz or a beating about 10 to 15 times per second.

So your brain has this frequency of firing, and that drives the brain function. So in someone whose brain is inflamed or lack fuel delivery to the brain, then that brain cell may not be able to work as strong.

It's kind of like, you know, you have a horse you're trying to racehorse and you don't feed the racehorse any food, and then you don't want it to run and it doesn't run or run slower.

So we have slower frequency of firing. Not only does you experience it mentally, such as brain fog, difficulty

retrieving words, you may have, you know, short, concentration and problem or focus issues.

You may have short term memory loss. You would have neurological symptoms. But downstream what happens is your brain drives this neuro axis downstream, like through the vagus nerve, through the parasympathetic, through the spinal cord.

So if your cortex, your brain's not firing, then everything down below will be slow slower as well. So this can result in decreased vagus nerve function decrease parasympathetic and much of brain function, by the way, is to inhibit sympathetic.

Much of what your brain does is inhibit the monkey mind. Right. Put the brakes on things. Right. Yeah, exactly. It's to put the brake on because by default we have monkey mind.

By default we're sympathetic. By default we have the lizard brain, the primitive brain that's always driving us to be aware of predators and look for food and so forth.

So much of the brain's function is to put the brake on things so we can stay calm. Right. That's the expression, the ultimate expression of a of a highly function functioning and actualized human is one who's, you know, like a Zen master that's meditating.

And, someone who's meditating is not monkey mind, like precipitating and moving all around. So the brain's function is to inhibit and calm us down. But if we lose that brake pedal, then things downstream, some function will slow down, right?

Some function that requires activation, like parasympathetic and vagus nerve will slow down, and other function that need to be inhibited, like blood pressure.

And and, you know, a sympathetic response will not be put on the brake pedal therefore overexpress. So we can start to have this downstream effect. And this is really important because if you have brain symptoms you have to start to realize that that's going to have effects downstream.

You can't just say well I just have depression. Well, if you have depression or if brain fog, that automatically means that you have some problem within your brain, meaning you're not either you're not getting fuel or nutrient to your brain to make certain substrates or neurotransmitter, or your brain's inflamed, therefore can carry out its function.

So you have to think like that and then downstream what other effects it may have. And the effect is really barbiturate. So coming back to auto, I mean I set the stage here.

So how does that impact auto mean. Well if you have decreased brain function you may have decreased vagus nerve function. It's very well known that it does that. You know it's not just the vagus nerve.

It's just overall parasympathetic function. A lot of people have heard of vagus nerve. But maybe just just give us an idea of what the vagus nerve does for those who aren't familiar.

Yeah. Vagus nerve is, a part of your cranial nerve. You have 12 pairs of cranial nerve that excite your skull. That's why we call the cranial nerves. And the 12 nerves have function that control sympathetic parasympathetic function.

A lot of it controls your facial movement and tongue movement and so forth. The vagus nerve control your muscles of swallowing and then also go further down the innervate.

Your heart lung has animation to your gut. And so is really one of the things that drives your gastric function, your your digestive function as far as motility and secretions of enzyme and stomach acid and bile flow and so forth.

Autoimmunity, Brain Fog, and Gut Dysfunction

So when you have decreased brain function, everything downstream is going to be compromised. So then the vagus nerve gets compromised. So not firing at the same frequency of firing.

So it slows down. So therefore that the function that innervates slows down to which will be motility. So people will experience constipation decreased secretion of digestive enzymes.

So then you don't digest food as well. All of this may lead to food that sits in your intestinal tract because they're not digesting well, nor is it moving down south.

So just sits there and they ferment. And that can create opportunity for dysbiosis and inflammation, which then can drive leaky gut. Just so you know, your intestinal tract is a factory for inflammation, like your intestinal tract is so good at producing inflammation.

All it needs is an excuse. Right. And the excuse will be being despotic. You have too much bad bacteria and not enough good bacteria. The excuse could be like eating processed food or food that you're sensitive to alcohol, right?

Like alcohol or high blood sugar, stress, environmental toxins. So it just needs a reason for it to turn on the factory to make inflammation. So your gut is an inflammation factory.

And once I turn out that inflammation factory, you develop intestinal permeability or leaky gut. You also drive this inflammatory response in the body that ultimately leads to the increased production potentially of antibodies.

And you have a lot of antibodies, which is are these immune proteins that that targeting specific pathogens. But when you have a lot of antibody production, sometimes these antibodies can target your own tissue.

So then you develop autoimmune. So I you know this is a long train but it starts with the brain losing its function losing its break, losing a stimulation.

The vagus nerve started causing gut issue and started causing immune system problem like inflammation and leading to autoimmune. So that's your brain even got in a five minute summary there I, I love that now you painted a really great picture right?

Because one of the most common autoimmune conditions that we see, particularly in women is Hashimoto's. Right. So we we take a look at Hashimoto's thyroiditis. Right.

And we think there's an issue a there's a immune issue with the thyroid. Right. There's something wrong with the thyroid. And, and so with your, you know, the picture you just painted.

Now we can perhaps take another look at this and say, well, this Hashimoto's may actually be, let's say, first related to, to gut issues that are going on.

Well, the gut issues may be caused by, by some brain issues that are going on. Right. And so and I mean, and other immune issues. Right. So I mean, we can have this brain issue causing a migrating motor complex issue that's not allowing the food to move through the gut, creating excess inflammation, leaky gut, you know, the wrong food choices creating on these Ottawa antibodies.

Right. And all of a sudden down the line, here we go. Right. And you're in the genetic susceptibility right. For each individual it's going to be unique. Right.

So this is what I think is fascinating is we take this old paradigm of Hashimoto's thyroiditis. There's something wrong with the thyroid. And now we could ultimately be looking at the primary issue was, started in the brain.

Right. And the choices that we're making, in our lifestyle that cause the brain issues that then lead to gut issues. And now we've got brain gut now causing immune. Right?

I mean, it's and this is where I think when as a as a clinician, as a practitioner, what I found is, is that when the people that come to see me, that's the point they're at, they're at this point where there's multiple systems that are in dysfunction and, and there's still a desire for the client or the patient to say, where is the problem?

Right? And it's like, well, you know, it's actually everywhere, right? Like we're at the point now where multiple systems are involved and we need to intervene, at least in one of them.

If not in multiple areas, clean up the the entire lifestyle picture. Right. And and it can be overwhelming. Right. So and I don't want to sort of, press that too much, but it's, it's the opportunities are everywhere to improve.

Right. And that's really the key difference. It's not like oh no, there's problems everywhere. It's actually, hey, there's opportunities everywhere to, to create a better health outcome.

That's a great way to look at it. And I just want to point one thing out, Jason, you brought up a really good point, is that, yes, a lot of people, by the time they come to seek out functional medicine care, the problem has spread to multiple areas.

Perhaps the brain, the immune and the gut is all involved. That does not mean that that the brain is always the starting point of the problem, because it's a three way triangle.

Sometimes for some people, the problem started with the gut, right? Some for other people, the problem started with the immune system having an infection, some type that they can resolve for other people.

It could be, you know, the brain. But invariably, no matter where it starts, all three system eventually gets touched. Eventually, the consequences spread to brain.

You mean God. This is why in the beginning I said, when people come in with chronic health issues, typically I see brain, immune, gut symptoms all three because by then it's already spread, but may have started with just a brain issue, or for another person, may have just started with a gut issue, but now is turning into a brain issue.

So, I don't want people to think that it's always starting at the brain. So this is why we have to think non-linearly be flexible in our thinking. But I have that framework to help us to say, okay, do we have this brain even got access?

That's all it is functioning together. Or if not, if this person just have got issues. Could it potentially lead to a brain issue down the line like neurodegeneration, neuro autoimmunity or Alzheimer dementia and so forth.

So we can start intervening right away? Yeah, I know I love that. And just to kind of give one more brain example, to tie in this concept is something like a traumatic brain injury, a concussion.

Right. And I used to play footballs in the contact sports and boxing's in another one. Hockey. Right. There's a lot of these contact sports where, you know, if anybody's experienced some traumatic brain injury, a concussion play can really lead to some problems down the line in these other areas.

Right. So this is where I just want to point to this idea that we think that something like a concussion is is brain specific. And to some degree it is.

But but but then it has impacts throughout the body. Right. And and again to, to take the other side of what you were just mentioning, these sort of acute assaults on the gut.

Right. We may have some acute infection that we, that we acquired. Right. Or we may take, pretty significant round of antibiotics, or we may be on birth control for a long period of time.

Right. And that's causing a specific assault on the GI system. And then what are the downstream effects of when something starts to assault the GI system?

You mentioned leaky gut and the effects on the immune system, but how how does that specifically relate to maybe causing or potentially eating grain issues down the line?

Yeah, absolutely. If you if you have gut inflammation, let's just say leaky gut, for example. And what's going to happen is you're going to create this double whammy of malabsorption and inflammation.

Okay. And again the gut is an inflammation factory is really good at making inflammation. These are cytokines. And you can trigger a neutrophils and macrophages to go you know fight the bad guy.

So inflammation is not bad by the way. Inflammation is your body's attempt to clear out some pathogen right. To protect you. But if that process being triggered excessively and it doesn't calm down readily, then you're going to have too much of that action going on which can start to damage your own tissue.

Now you're going to have tissue debris, and now you have more things to mop up, which triggers more inflammation, because inflammation is also the same process that's used to mop up cellular debris from damage.

So that's all the immune system's job. And it can start in a gut. And leaky gut is one of those things that can promote this inflammatory response. And then once you promote the inflammatory response, then what happens?

You can actually create, blood brain barrier breach, because we know that the small intestinal junction protein, the psycho architecture of the small intestinal tight junction, it's the same as the blood brain barrier, which are the blood vessels that supply blood to the brain.

Those endothelial cells, the blood vessel lining, have the same societal architecture as the gut lining. They have Zombieland, they have actin, they have cloud ins and the glued ends.

These proteins that kind of hold the cells together. So when you have antibodies, by the way, when you have leaky gut, how do we even measure it? Leaky gut.

Well, we measure it by measuring antibody against these proteins in your small intestine lining. And because this the the similarity between the psycho architecture of these proteins that are found in this small intestinal lining and the blood brain barrier, when you have antibody against, say, Zombieland in the small intestine, that same antibody can attack Disneyland.

That's in your blood brain barrier. So then this is why when we have leaky gut or gut inflammation, we all you not always. But there may maybe there's a pathway for getting brain inflammation as well.

So it's important to know that not every single person with leaky gut is going to have leaky brain. But it's a there's a pathway that leads to it and it can happen.

So it all depends on individuals, how aggressive they are at doing the lifestyle things. What are their preexisting health conditions. If you are a diabetic or already inflamed, you already have high blood pressure.

Then you're the person that's going to do worse when you have leaky gut or have a concussion and things like that to suffer more consequences of that.

Leaky Gut, Blood-Brain Barrier, and Microglial Inflammation

Yeah, and correct me if I'm wrong, but my my perception is, is that, you know, while that can go wrong in the gut and we can have an inflammatory gut ecosystem, there seems to be a little bit quick of a response to recovery at the gut level when we get things right versus when the brain starts to turn on fire.

And you get these glial cells and micro glial cells with inflammation. Sometimes that can just remain on and it can be hard to turn off. Right. So I mean that's that's one of the impacts sometimes of of that gut brain connection is when we start getting inflammation at that brain level, then, you know, it can take some real intervention and

getting things, very correct in order to sort of calm that inflammation down.

I would say that's correct. And because, you know, your gut lining turns over every 2 or 3 days, your intestinal epithelial cells renew itself every 2 or 3 days.

And so you're constantly putting food in there is constantly doing things. So I think that the response time in the gut may be faster in the brain, specifically with micro glial cells when the micro glial cells become primed.

So when, when, when you go through brain injury, your micro glial cells, which are basically macrophages, it's a type of immune cell in the brain, the same as you have in the rest of the body called macrophages, like a big eater.

But in the brain they just have they look different. They have like big arms like the glia have like these arms that call a ram ified processes. And these glial cells can actually when they become inflamed and trigger they can literally change their morphology or their shape into a, a type where it's constantly triggering inflammation.

So literally, and someone who have repeat a concussion or brain inflammation later, Michael, glial cells can actually change into a shape and behave in a way that's kind of stuck on inflammation, and it doesn't want to come off of that.

And this is one of the reason why it's so difficult for some people with brain issues to resolve these brain inflammation that they happen. Yeah, I mean, it's I've seen a couple of these cases where sort of this micro glial priming occurs and it's, you know, it's chronic anxiety, it's difficulty sleeping.

The smallest triggers can just really exacerbate a response. Right. And I really feel for these, these people because it's it's a really challenging situation to, to get Ahold of.

But Doctor Khan there's, there's, there's aspects to of of the gut ecosystem that I'd love for you to touch on with regard to the immune system specifically, because this is where some people say a majority of our immune system is housed.

Right. But there's an intimate relationship with the gut, ecosystem and the immune aspects of the gut. So maybe you can talk to me a little bit about that.

Why that's such an important, directional relationship. Bidirectional relationship. Right. Because the microbiome. And that's what we're kind of referring to here, that the gut ecosystem, I mean, it's throughout the entire gut, by the way, and, throughout the entire GI tract and the GI tract starts at the mouth.

Right? So you have the oral microbiome, you have the gut microbiome all throughout the GI tract. So it's not that, you know, in your small intestine, say, in the duodenum or jejunum, the midsection of someone that you have zero bacteria, you just have a lot less and you have a lot more bacteria that are supposed to be there in a large intestine, in a colon.

That's usually where these microbiome, most of them are residing in the colon. And, because the gut is such a large surface area. Right. And then remember earlier I said the gut is an inflammation factory.

And by default, what that means to the gut is the gut lining is a place for surveillance, right. Because to trigger inflammation you first have to detect what you want to kill first.

Inflammation is your immune system way of killing a pathogen. So you have to first survey, research and destroy. So you got to have a searching function which is surveillance, and then destroy a kill function.

So your gut, the entire GI tract from the mouth all the way down to the other end is lined with immune cells. You have immune signals, Secretary IGA immunoglobulin A, you have a tonsils.

You have got associated lymphoid tissues. So you have all these things that are part of the gut immune system. So

I think if we're going to talk about how gut play a role in immune function, we don't want to make it sound like just the beneficial bacteria.

The bacterial flora in the gut is the only thing that's playing a role in in immune function. Right? There's a lot of other things like the lymphoid tissues, like, you know, the cells in the small intestine, the lining immune cells in this in and throughout the entire gut.

That's play an important role. But certainly the microbiome, the bacteria in the gut play a very important role in that. Basically what they do, a lot of it is basically through competition, right?

There's scarce resources. There's only so much food around. And so all these bacteria down there, whether good or bad, they all compete for the same amount of resources.

So if you have a lot of beneficial bacteria, you basically are crowding out the bad guy by competition of resources. So having good amount of microbiome that are supposed to be there in abundance helps a crowd out that the pathogenic bacteria and the secondly, these microbiome play very important role in cytokines and immune signaling.

Right. So much of it is all done through signaling. Right. It's not that the bacteria is down there eating up the virus is that the bacteria down there is is signaling and is causing the cytokines to release to help your body to be able to do its job better.

It's already looking, searching and destroy everywhere, not just in the gut, throughout your own tissue, but when you have cytokines and make that communication more efficient.

However, the cytokines can also go the other way. It can become too efficient, and now you're triggering too much of an inflammatory response. So I like to kind of likened the gut microbiome to what you want is balance, right.

People tend to think like oh, if microbiome is low. So more is better, right? No. What you want is balance in these beneficial bacteria. So it's not like just shoving like unlimited amount of probiotic is going to solve the problem.

Right. Because there are over 1000 species and there's many more that's being discovered all the time. And there's not a probiotic that you take that has like all these different thousands species.

Now if you do fecal transplant potentially. But remember, everybody's microbiome is a unique fingerprint so that you can get somebody else's, you know, fecal matter their their microbiome implanted into you.

But that's their fingerprint. That's not your fingerprint. Right. Kind of like organ rejection potentially. It may not work for you. So this is why fecal transplant doesn't work across the board for everyone where it works, it's like, wow, miraculous.

How does that work? But there's also times where it doesn't work. I know this because I have a lot of clients in Europe and in England, actually, there's fecal transplant clinics where you can go and just pay cash and just get it done.

And a lot of people come to me like, oh, yeah, I done that already three times, actually, and it didn't work. So it doesn't mean I've never worked. It just didn't work for that person.

So what I'm saying is it can work, but it's not universal. So we have to always think about, okay, what's the backup plan? What's our contingency plan.

And when it doesn't work, why is there other pathways. There's other things that we can do. So we start to think long non-linearly and flexibly. And then then we become okay with not knowing everything.

But we know enough to make a change and to do something right, to help people to make their own lifestyle

change.

Gut Microbiome and Immune Regulation

Because ultimately that's going to lead to the most important thing they can do is the things that people do every day, rather than a fancy pill that we can give them.

Well, you led into it. My next question exactly, which is, okay, so we got all this information about the brain, the gut and the immune system and how any one or multiple of these systems can dis regulate or re regulate the others.

What do I do about this? You know, obviously there's targeted clinical interventions that you work with specifically with each client. No question. Right.

But but how do I think about this idea from a lifestyle perspective? What are some things that I can do to help create more balanced function and harmony in these systems?

And then if I've got some maybe known dysfunctions, whether it's brain, gut or immuno or otherwise, you know, what are some tests or how do I how can I go about investigating this deeper?

Sure. Yeah. And I think, it's important to say, Jason, that the live cell things or whatever intervention you choose to do a supplement or, take on a specific diet before you do it, you want to first identify what is the actual problem, right?

Because just doing something without even knowing what your problem is, is it's not helpful. You know, a lot of people say, well, you know, I want to just do low Fodmap and do a simple diet. Why?

Or because I think I have Sibo. Do you really? Are you sure? Right. Let's find out. Right. Because a lot of people just suppose they have some problem and they're doing taking the supplement, doing some kind of, you know, intervention without actually knowing whether that's actually their problem.

So they're doing things because it sounds like it's their problem, but it's not. And this is reason I bring up the brand name. You got access because the symptoms can sound very similar, right.

It can overlap Hashimoto's look like fibromyalgia, look like Lyme patient. They all have brain fog. They have inflammation. So which one is it. So it's important to know which one is it okay.

But how do I help people to do this. Is that I like them to follow like a roadmap a roadmap meaning okay, there's a sequence to where there's certain things that are more important than others as far as setting up the foundations of health, because if you do things out of sequence, then you may not get there.

Kind of like the password to your phone, you know, if the password to your phone is one two, 1234, you type in four three, two one. Well, heck, it's the same numbers, the same number of numbers.

It just in opposite order. And guess why your phone doesn't unlock in your body? It kind of works that way. Okay, so a perfect example would be this one in the first step on the roadmap that I look at kind of identify what where do we start.

Right. A lot of times people with chronic condition with brain even got I have brain. You mean where do I start. Is it do I take a brain supplement? Do I take a new cell phone? Do I take the supplement?

The first place you start is actually looking at fuel delivery. Okay. Fuel delivery means your ability to deliver fuel to your working tissues. Because if you can deliver fuel you can't produce mitochondria, you can't produce ATP, you can't carry out the processes that help you to make new tissue, to detox, to transport.

Nothing works. So a lot of people are skipping the step and they go straight into I must have mercury issue

because I had mercury amalgam. So I got to do a metal detox.

Well, maybe you do, maybe you don't. Because if you have fuel delivery issues, you do a detox. This is how you set one somebody up to feel crappy and potentially make them worse, especially with a brain problem.

You know, if you make a brain problem worse, you're risking losing brain cells. And brain cells are post mitotic. They don't go through mitosis. They don't divide and make new brain cells.

So if you lose brain cells at a faster clip than aging, then you're advancing that neurodegeneration. So we want to protect brain cells at all costs. And doing aggressive detox without setting up the foundations of the body is basically asking for, you know, speeding up inflammation, which can potentially be in the brain or in other places of the body right now.

As far as fuel delivery, let me just say this real quick. What I mean by fuel delivery is, number one, oxygen and number two blood glucose. That's what I mean by fuel delivery.

Yeah. Really, I wouldn't include digestion in that one, because if you can't digest your food, you can't deliver a nutrient or fuel to your body either.

But but oxygen and glucose is the most important thing. In fact, in functional neurology, module number one, when I went to a functional ology school, first thing they teach you like, hey, neurons.

For them to survive requires two things fuel and activation. And I add the third thing no inflammation. So fuel is oxygen. And glucose activation means you got to use your brain.

Your brain has to be constantly be firing. And the way you fire the brain is not just by thinking, but is all by movement. When you move, you're firing your brain.

Proprioception, right? So so fuel and activation. The first thing we learn in functional in reality. So that just how important it is. Right. But a lot of time in functional neurology in the past the fuel was kind of like not really looked at because they didn't really work with nutrition.

Yeah, it was accepted that optimal, you know, delivery was happening. Right is right. But but we can't accept we can't assume that. Yeah. Because if someone was anemic they're going to have low oxygen.

We got to fix that. Or the functional neurology rehab the exercise we do to rehab the specific part will not work because the brain cells too tired and doesn't have fuel to be able to heal.

Right. So so oxygen is important. So we look at anemia, we'll look at blood pressure issues. We'll look at circulatory problems as a proxy to indicate whether there's an oxygen issue.

And obviously blood glucose. Pretty obvious. We'll look at blood sugar stability whether you have hypoglycemia or insulin resistance. They're both bad because the both are going to impact your delivery of fuel to not just your brain, but every single cell in your body.

So those are things I look at first. Well, this is this is really interesting because, you know, I think blood glucose is it's some common awareness right now.

Right? You know, we've got the continuous glucose monitors which are cool. We've got finger sticks.

Roadmap for Healing and Fuel Delivery

We can we can actually test our blood glucose, fairly readily as a, as a consumer population. And yet I, I think not only in the consumer, population in the general public, but also even in the practitioner doctor world, I find that there's still an appreciation for, for blood glucose and the importance of maintaining good blood glucose and not

having it go all over the place, no matter what disease you're looking at, no matter what dysfunction, improving blood glucose and keeping blood glucose as well as insulin stable, as stable as possible.

Good regulation is fun is fundamental. It's foundational. Right. Like especially for brain. Yeah. And it's it's wild how underappreciated it is. So I think that's I love that you start there. Right.

And and you you mentioned oxygen right. Another thing that comes to mind when it comes to oxygen is is breathing. Right. And so we don't need any doctors. We don't need anything.

This goes back to kind of our eastern, talk at the beginning, but but learning how to breathe properly. Right. The pranayama is from the Vedic culture, the eastern cultures and in circulating qi.

Right. I mean, qigong is a is a practice that I have grown to love, and it has to do with awareness in breath. Right. And and this is fundamental to all those, those traditional.

Right. So, so learning to breathe and incorporating some kind of breathing practice can be really, really helpful for these things. Right? Absolutely.

So so it comes down to identifying what is the the actual problem and what is the biggest problem for that person and how do we set it up. So doing the first things first rather than jumping all over the place doing everything.

So if someone who's very stressed and they have really shallow breathing and you see they have low O2 saturation, then yeah, breathing exercise will be absolutely the thing to do for them.

But if this person was already a a Yogi mastering the breathing every day and this person is breathing every day and vegetarian is very anemic, guess what do you go you look at the diet.

Okay, maybe you're being too strict and you're not eating enough iron and this is why you're anemic. Then we fix that, not the breathing, so that the solution is dependent on what the problem is.

I think there's so much emphasis, Jason, out there in that, in a, you know, summit world and this information world, right? It's almost information overload that people are looking for solutions rather than looking for identifying the problem.

Totally. And what I really encourage our learners, people who are in our program to do is to learn how to identify the problem first before you even take on any solution, because once you identify the problem, the solution comes.

It's easy. Once you know what the problem is, the solution is plenty. But the problem? The hard part is identifying the real issue and how to set up a process.

So you're addressing it in a way that can untangle these issues. I love it, and you're really teaching people how to think like an integrative functional practitioner, right.

Like that's really how what you're teaching them. Because even with something like Sibo, right. Like when I learned that there was like six different causes of Sibo, one being causing it's stemming from the from brain issues and perhaps a migrating motor complex creating the environment for which Sibo can, can, can manifest.

Well, then all the chemo treatments aren't going to resolve until I get that migraine motor complex and potentially the brain issue that's causing it resolved.

Right. So, again, that that only came through functional integrative training, to be able to understand that that's that there's all these mechanisms.

Where to Find Doctor Khan's Resources

And so going about it in a, in a precise way and developing a proper roadmap, I agree is fundamental and it's critical. And even for, for those practitioners out there who maybe haven't been trained in this way, you know, your roadmap is, is a, is a fantastic way to go about something like this.

So, Doctor Khan, where can people find more of your work? I know you've got some master classes, you've got a lot of great things out there. And trainings.

How can they find them? Yeah. Thank you for, giving me a chance to share. Yes, we have, a brain immune gut masterclass. And, this masterclass where I give people, like, the 30,000ft view of what we've been discussing, but a little bit more detail.

So that's a great primer on understanding, bringing gut and how different parts of the roadmap, that I use to help to heal that. And I also have a pretty well stocked YouTube channel so people can, just search on YouTube.

Doctor Peter Khan Moorhead, a Chinese guy will pop up pretty easy to narrow. So there's a lot of great videos there that's a free resource for people.

Our Facebook page is also pretty cool, too. So, find me on Facebook as well. Connect with me on social media. Well, I will say, yeah, your YouTube channel is fantastic.

I've taken a look at, some of your videos and you do get into some great detail, a very good, educational resource, for anybody out there, whether they're a practitioner or, or just in the general public looking to improve their health.

So, Doctor Khan, thank you so much for coming on and sharing us, sharing with us your wisdom, and your amazing insights into the the brain immune gut access.

Thank you so much for having me, Jason.